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FORTUNE

ARE YOU BETTER OFF NOW?

Who's Really Won—and Lost—in the Reagan Years

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FORTUNE

The price of prosperity for many boomer families is that both husband and wife are working.
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COVER:
Joe McNally photographed (left to right) John Griffith, 65, retired IBM computer specialist, Ossining, N.Y.; Lucy Correa, 28, secretary, Festival Productions, with son Joshua, 10 months, New York City; Barbara Dalton, 35, research scientist at Smith Kline & French, King of Prussia, Pa.; Richard Witherspoon, 31, area vice president, Pepsi Cola Co., Indianapolis, Ind.; Charles Jacobson, 47, chairman of Jacobson & Associates, financial consultants, Edina, Minn.; and Ray Strickland, 47, machinist at Nucor Steel, Darlington, S.C.

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EDITOR'S DESK

JOHN ABBOTT

Burck, Prewitt, and Richman with essential tools

HOW HAS America fared under Ronald Reagan? "This is *the* central question on the eve of the presidential election," says associate editor Louis S. Richman, author of our cover story, "Are You Better Off Than in 1980?" Conventional wisdom has it, of course, that if a party delivers prosperity and peace while occupying the White House, it will have the next election sewed up. Richman's conclusions may be somewhat discomfiting to Democrats. Did America improve its lot during the Reagan Administration? "For the most part," he says, "yes."

Richman has based his story on hard data, not opinion. Before he sat down to write, he spent six weeks analyzing 16 years' worth of Census Bureau data on income and poverty levels for every income group, racial group, and household type in the U.S. The number-crunching was essential to separating fact from ideology. As Richman puts it: "If you ask a politician whether we're better off, you get polemics. If you ask an expert, you get opinion. But if you work at the numbers yourself, you get the story."

His conclusions may be surprising to readers who have lived through the dislocation and economic restructuring of the 1980s and to those who feel that upward mobility is no longer an American dream but a losing struggle. He discovered, for example, that it is now relatively cheaper to pay for a home than when Ronald Reagan first took office, and that the black middle class has made impressive gains. He also believes that baby-boomers are doing much better than they think. "Having grown up in a time of unprecedented growth," he notes, "they have unprecedented expectations."

Reporter Ed Prewitt assisted Richman by searching the country for Americans who had lived the stories the numbers told. Most stirring was the blue-collar couple who between them have been laid off and rehired 14 times in the past 14 years. Says Prewitt: "They were surprisingly unbitter. The husband, an auto worker, was a capitalist at heart. He knew America had to be competitive and didn't blame the car companies for that."

Not every segment of our society, however, demonstrated such prosperity and resilience. Charles Burck, the editor of our three-part cover package, examined the gap between America's wealthy and its poor in a separate story. Burck found that it had narrowed during the first 20 years of America's postwar period, but widened steadily during the last 20. Yes, the rich *are* getting richer—although not, as liberals have contended, at the expense of the poor. Says Burck: "The reasons reflect rising opportunities for more people." Both Burck and Richman conclude that the uneducated remain at the greatest disadvantage. "The job prospects for the uneducated are worse than ever," says Burck.

That's something for November's winner to think about, no matter who he is. The American dream has always been one of prosperity—for all.

Marshall Loeb
MANAGING EDITOR

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ARE YOU BETTER OFF THAN IN 1980?

Some Americans have lost ground, and many who are gaining think life is tougher than they expected it to be. But most are doing better, and they say so. ■ *by Louis S. Richman*

UPDATED, the memorable question Ronald Reagan put to the public in 1980 is once again at the heart of a presidential campaign, and the way voters answer it will shape the economic policy that guides America in the years to come. Should government try to redistribute well-being to specially afflicted constituencies, as it did during the Carter years? Or should it merely promote growth and referee claims to the output, the philosophy of the Reagan era?

Polls and surveys suggest that a majority of Americans *do* consider themselves better off. Indeed, the University of Michigan's Survey Research Center reports that more Americans feel good about economic conditions than at any time since the late 1960s. Statistical evidence suggests why that is so. America's "misery index"—the sum of the inflation and unemployment rates—has tumbled from 17.9% in January 1981, when Ronald Reagan became President, to 9.7% today. Counting all Americans, real per capita income has risen $1,500 since 1981 to $12,287 a year, the highest level ever. A solid and growing black middle class has emerged, and black unemployment is down—down dramatically, in fact, for black teenagers.

But after nearly a decade of extraordinary economic turbulence, some Americans are clearly worse off. Young workers who haven't finished high school are losing ground. Even the increasingly affluent middle class has worries. Financing a college education is tougher, and working couples who are raising children find that life is more difficult than they expected it to be.

So after eight years of Reagan, who's really ahead and who's behind?

REPORTER ASSOCIATE *Edward Prewitt*

Tom McEntire's salary supports the family. Marci stays at home raising Brandon, 12, and Linden, 6.

ONE-INCOME FAMILY

Any discussion starts with what's happened to wages and incomes, a subject badly battered by election-year statistical broadsides. Democrats score points with the declining average hourly wage, which has fallen 2.6% in real terms since 1981 to $8.98 an hour. On the other hand, Republicans remind voters that median family incomes are up. The Republicans have the better case.

THE HOURLY WAGE is a poor proxy for financial health. Among other things, it doesn't reflect fringe benefits such as health insurance and pensions, which have increased 42%. Nor does it include the growing proportion of compensation coming from profit sharing, bonuses, commissions, and other incentive pay.

More important, it doesn't even say enough about basic hourly wages. These represent the cash compensation of roughly four-fifths of all people employed in private industry, so if the decline were widespread it would be hard to imagine what accounts for the optimism in those polls and surveys. In fact, the brunt has been borne by smaller groups. Like any average, the wage figure is powerfully influenced by changes at the extremes—which have been significant during the Eighties.

At the top, the old labor elite, including steelworkers and auto workers, has taken a beating—one reason the real average factory wage fell 10% to $9.91 an hour. At the bottom, the influx of baby-boom workers has helped depress wages in entry-level jobs. In between, hourly wages have been rising smartly for many people. For the fast-growing financial services, insurance, and real estate sector, for example, they are up nearly 9%, to $8.73 last year (see "Don't Slow Down the Job Machine," page 52).

The measures of what families actually get tell a more complete story about well-being (see chart, page 40). Median family income, reflecting the buoyant expansion of the work force, is well above its 1981 level and has risen steadily since the recession that ended in 1982. Because families are smaller and more members are working, real per capita income is up even more. Among blacks, it has advanced a solid 15% during the Reagan presidency, a vast improvement from the 4.6% rise of the Carter years.

So why do politicians think voters will buy the idea that living standards have fallen? Partly it's because prosperity in the Eighties was purchased with the jarring—but inevitable—economic change that *has* left some Americans worse off. Roughly 960,000 blue-collar factory jobs have disappeared since 1981, and givebacks have cut

PHOTOGRAPHS BY ROB KINMONTH

To stay afloat, Jim and Carol Adams of Raleigh, North Carolina, both wor ... Michael, 3, puts in 10½ hours a day at a child care center.

TWO-INCOME FAMILY

gains for many of the workers who've kept their jobs. Meantime, younger workers with no more than a high school diploma have lost opportunities their predecessors had. During the Reagan years, real median earnings for those age 25 to 34 slipped some 5% to $20,378. Incomes for less experienced 20- to 24-year-olds fell 12% to $13,084. For some of these unskilled and semiskilled workers, a high-paying factory job once offered a ticket to middle-class affluence. No more.

Expensive blue-collar jobs that require little skill, always a minority of manufacturing employment, are a luxury the country can ill afford in a more competitive global economy. Still, the earnings setbacks suffered by these younger people have put the dream of owning their own homes out of reach for many. They also pointed up to anyone who needed reminding that an increasingly costly higher education is more than ever a prerequisite for financial security.

Even those who made real gains have had some trouble adjusting to the changes that swept American social and family life in the Eighties. The Reagan era bestrode one of the signal social events of the century: the maturing of the vast bulge of postwar babies and their movement into their midcareer lives as workers, parents, homeowners, and for the older ones, payers of college tuition bills. The roughly 95 million Americans born between the end of World War II and the summer of Woodstock make up a majority of voters for the first time.

Unlike older generations who knew the privations of the Great Depression and the galvanizing solidarity of World War II, the boomers had their expectations greased in the complacent prosperity of the Fifties and the indulgent Sixties. For many of these ag-

ing Aquarians who are now anxious parents and harried breadwinners, living richer does not mean living easier. Says University of Michigan economist Richard Curtin: "However well or badly they may be faring, the baby-boomers have reached that stage of their lives when economic pressures are greatest."

THE PRICE of prosperity for many boomer families is that both husband and wife are working. Traditional households where dad is the sole breadwinner now comprise only 17% of all families. There are 15.2 million such families, nearly three million fewer than in 1980. The number in which both parents work, by contrast, has grown to 27.2 million—over half of all married couples. Some 29 million mothers between 25 and 44 work for pay, nearly a third more than in 1980. The fastest rate of increase is among mothers of toddlers under age 3. More than half these mothers work, vs. fewer than a third a decade ago.

The relatively few boomers who hew to the old-fashioned family arrangement generally trade material prosperity for family values. Among the Ozzie-and-Harriet set, real median incomes since 1981 have risen only 3.1%, to $26,652. Families in which both spouses work have enjoyed a much bigger real gain—up 8.6%, to $40,422.

Do the traditionalists consider themselves worse off? Some do, of course, but not Tom and Marci McEntire who live in suburban Philadelphia. The McEntires are raising their 12-year-old son Brandon, and 6-year-old daughter, Linde on a disposable income of approximately $30,000 that Tom earns as a quality control manager for Merck, the pharmaceuticals maker. The McEntires' decision to do without a second income stems from their childhood experiences. Marci's parents divorced when she was 11, and her mother went to work as a hotel clerk to support her and her older sister. Tom, the son of a career Navy officer whose assignments uprooted the family six times before he was 15, thinks that his stay-at-home mother gave their peripatetic family a sense of stability.

The McEntires have no illusions about the trade-off they're making. Says Tom: "We'd like to buy a bigger home, drive a fancier car, and dine in restaurants with linen tablecloths like a lot of our two-career friends, but we can't afford it." Marci finds that being a traditional mother sometimes puts her on the defensive in an age when more mothers are working. "Many people tend to look at women like me as just mothers who stay home and watch soap operas," she says, "but my idea of having kids is to be home to raise them. They're young for such a short time, and I wanted to be there to share it with them."

Would many women choose to be like Marci McEntire if they could somehow scrape by on their husbands' earnings? That's what the Democrats argue. Says Lawrence Summers, Michael Dukakis's chief economic adviser: "More women are being *forced* to work to make ends meet."

The evidence is equivocal at best. The two-earner route to prosperity can be exhausting. Kids must be shepherded to day care—more often than not a worrisomely *ad hoc* situation that falls to working mom to arrange and execute. Both parents creep along traffic-snarled roads to jobs with companies that promise less security but expect more effort. Success wasn't supposed to be this hard. One hint that running tandem in the rat race may not be what most people want: Nearly three-quarters of the high school seniors in the survey on page 44 were no more than lukewarm about the prospect.

Still, if more women are working because they must, not because they choose to, you'd expect to find more working women whose husbands are in the lower income ranks, and fewer among the more affluent. But the reverse is true: Only 42% of women whose husbands' incomes fall below the household median are working—vs. 71% of those married to men who earn more than the median.

The major reason more women in their childbearing years are working seems to be simply that the workplace is far more inviting to them than in the past. The infamous "pay gap" between women's and men's earnings has closed by five percentage points, to 65%, during the Reagan years. And nearly 20% of today's working women earn more than their spouses. Women today are winning college degrees in nearly the same proportion as men—at a rate of

The nurses saved and borrowed to buy an $85,000 San Diego townhouse.

NEW HOMEOWNERS

MIDDLE-CLASS NECESSITIES

	1981*	1987	% Change
Are they more expensive?			
House price..... Median	$84,965	$88,624	4.3%
Mortgage payments..... Monthly average	$666	$594	−10.8%
Four-year college costs[1]			
Public average annual...	$3,436	$4,130	20.2%
Private average annual..	$7,569	$10,050	32.8%
Appendectomy[2] ..... Median	$636	$714	12.3%
Can people more easily afford them?			
Family income ..... Median annual	$28,483	$30,853	8.3%
Per capita income..... Median annual	$10,784	$12,287	13.9%
Liquid assets to debt.... Year-end ratio	169%	166%	−3**
Saving rate ..... Year-end	7.5%	3.2%	−4.3**
What's the trade-off?			
Leisure hours[3] ..... Median weekly	19.2†	16.6	−13.5%
Working mothers ..... Percent of women with preschool children	48.9%	56.7%	7.8**

*In 1987 dollars. **Increase in percentage points. †1980. [1]The College Board. [2]*Medical Economics* magazine. [3]Louis Harris & Associates.

over 525,000 a year. Half of all accounting students are women, as are nearly a third of all law and MBA students.

Since 1981, the number of women employed as managers and professionals has jumped about 48% and 28% respectively. Some 45% more hold skilled blue-collar production jobs. Many others balance work and family by creating jobs at home: Baby-boom mothers are giving birth to their own businesses even faster than men. With so many opportunities to do so well, it makes little sense for women to remain out of the labor force.

If many couples have trouble making peace with the strains of their dual-earner lives, most manage to achieve detente. Carol Adams, 26, is fairly typical of younger working mothers. Husband Jim, 32, an operations manager with a small textile firm in Raleigh, North Carolina, earns $28,000, enough to carry the costs of their $47,500 duplex home. Carol returned to her $17,000 job as a dental hygienist seven weeks after their son Michael was born. She and Jim worry that Michael, now 3, spends 10½ hours a day in a day care center, but they feel she must work, as Jim puts it, "to protect our lifestyle." Says he: "Families of the past were less material-minded. The way today's society is, in order to buy that microwave, that VCR, the two cars, two incomes are necessary."

WHAT OF the common belief that Americans are no longer able to afford homes of their own? It's true for some, notably those between 25 and 34 who have no more than a high school education. They are particularly apt to be left out if they live in areas where affluent newcomers are driving real estate prices skyward. But on the whole, homes have rarely been more accessible. Seven years ago the annual after-tax carrying costs of a median-price home took a budget-busting 36.3% of the median family's income; they now take only 22.5%. Home ownership among young married couples—who are, as ever, the principal first-time buyers—has been rising since 1981, says Richard Hokenson, a demographer at the Donaldson Lufkin & Jenrette investment firm.

Even in booming real estate markets, it doesn't take a big income to get into a house. Consider Adan and Rita Nuno of San Diego, both 28 and immigrants from Mexico. Adan works as an information specialist for San Diego County; Rita is a clerk with San Diego Gas & Electric. By carefully husbanding their combined gross income of barely $35,000, they saved some $350 a month toward a down payment. With prices in the area rising 10% a year, they jumped when they found an $85,000 townhouse they could buy with just $7,000 down on the city's southern edge, in Chula Vista. With just half that amount saved, they borrowed the remainder from their parents and moved in last May.

Blacks have shared unevenly in the prosperity of the Reagan era. A third remain mired in poverty (see following story). But the continuing rise and spread of the black middle class is one of the great success stories of the past 20 years. Since 1981 the number of two-earner black families increased by over 300,000, to 2.4 million, and now make up a third of all black households. Median incomes among couples working full time rose a real 10%, to almost $40,000. Says Bart Landry, a University of Maryland sociologist who last year published *The New Black Middle Class*: "This is the first secure generation of middle-class blacks. They came of age enjoying the gains won in the civil rights movement, and they have developed into a confident generation that takes a middle-class lifestyle for granted."

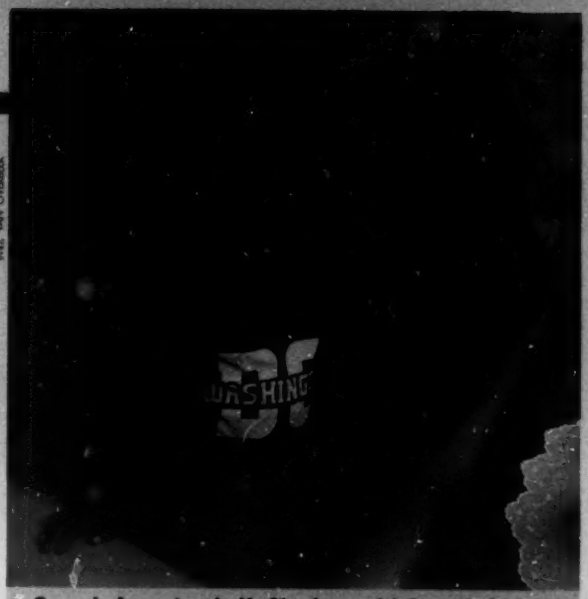
For many young black couples, like Sammie and Sharlene August of Houston, hard

Lloyd Jester, a machinist from Kenosha, is laid off for the fifth time since 1982. But he says he's doing far better than his father, who was "concerned about surviving."

LAID-OFF WORKER

work is starting to pay off. "We're in the best shape we've ever been," says he. Sammie, 30, grew up in the tough Fifth Ward of Houston, the youngest of nine children raised by a single mother. Sharlene, 29, a small-town minister's daughter, was one of ten children. With the help of a football scholarship, Sammie earned a degree in management and marketing from nearby Prairie View A&M University. There he met Sharlene, a business education student attending college with the help of a work-study grant.

August lost his first job as a machinist with a small steel company when Texas slipped into recession in 1982. He worked to support his wife and young son, Sammie Jr., for three years—sometimes 16-hour days, seven days a week—as a $6-an-hour security guard. In 1985 he landed a job as a youth counselor for Harris County. Now



WILL VAN OVERBEEK

Sammie August and wife Sharlene, with Sammie Jr., are planning to buy their first house this year.

BLACK FAMILY

Divorcée Linda Polk works in the underground economy to raise Teddy.

SINGLE MOTHER

that Sammie Jr., 6, is in school, Sharlene went to work last March as an accounting clerk for the Houston water department. With secure jobs and a combined after-tax income of $33,500, the Augusts are planning to buy a house by year-end.

Critics deplore the Reagan Administration for indifference to affirmative action, but the record suggests that the efforts already in place have been doing what they are supposed to. Economist Andrew Brimmer points out that buoyant job growth in the Eighties helped black workers lift their relative share of total employment as more entered the labor force. The unemployment rate for black teens, unchanged in the Carter years, fell ten percentage points to 31% during the Reagan presidency. Says Brimmer: "Large companies have institutionalized affirmative action hiring and promotion practices. There are a lot of black junior officers in the corporate pipeline. Their skills and the ability to do the job will determine how many of them will become majors and lieutenant colonels." And generals.

Few groups have suffered more shattering reversals of the American dream than those Jesse Jackson refers to as the "purged and submerged"—the workers, mostly industrial, who lost their jobs during the era of restructuring. But most have resurfaced.

Of 5.1 million full-time workers who lost jobs through plant closings and employment cutbacks between 1981 and early 1986, according to the Bureau of Labor Statistics, two-thirds were reemployed. More than half of those are earning as much as or more than they did in their old jobs. Among those who could not find jobs, many retired early and others have sunk into the ranks of discouraged workers who've given up trying.

Others retain their resilience. Lloyd Jester, 46, a machinist from Kenosha, Wisconsin, has been laid off five times since 1982 from his $14-dollar-an-hour job with an Eaton Corp. division hit by Japanese competition. With 20 hours of overtime a week in good years, he grossed nearly $50,000. But as he bounced between layoff and recall during the Eighties, his wife, Jane, managed to hold on to her $14-an-hour-job in the paint department of Chrysler's Kenosha plant.

The money Jane brought home in addition to Lloyd's unemployment benefits let them keep their three-bedroom frame house. It also meant that Lloyd could preserve his 20 years of seniority with Eaton, rather than grab the first job he found. Now that the weaker dollar is helping to boost the company's orders, Jester expects to be back to work soon. Despite his seemingly endless employment setbacks, he considers himself far better off than was his father, a Missouri farmer. Says Jester: "My dad wasn't concerned about doing well. He was concerned about surviving."

Life can be also tough for single mothers and the children they raise. Single women now head nearly ten million households with almost 13 million children. Some 34% are in poverty, many because their marriages have broken up. Economists Greg Duncan and Saul Hoffman found that in the year after a divorce, the income of newly single mothers drops by an average one-third. What the numbers don't capture, however, is a lot of energy and ingenuity shown by single mothers who fend for themselves—sometimes on the margins of the underground economy.

One example: Linda Polk (her name and other details have been changed to protect her identity), 41, a thrice-divorced mother of a 2-year-old toddler named Teddy. When her marriage ended a year ago, Polk moved into a two-bedroom rental house some 40 miles outside of Chicago. She receives neither alimony nor child-support payments, though her former husband does pay for Teddy's health insurance. But she is an adept wallpaper hanger, and working for cash only, please, can clear up to $700 a week tax-free. That's more than enough to cover all the bills and pay a neighbor $110 a week to look after her son. She has no health insurance, doubts that she will be able to buy a home, and frets about sending Teddy to college. Still, she says, "I worry ten minutes a month. I have a real job. I'm chasing after a

2-year-old. I can't be there for both of us if I'm running around saying, Oy! Oy!"

The one part of the contemporary American dream that does seem in danger of evaporating for many is a college education. Worse, college is rapidly becoming a necessity: The good jobs of the future belong to the educated. Young male college graduates with between five and ten years' work experience earn median incomes of $42,346, a third higher than their peers who have only a high school education. The spread in 1981 was just 20%. While the average total annual cost of a four-year public university education has risen some 20% to $4,130 since 1981, government financial aid has grown a bare 6.5%.

Anyone with the aptitude can still land in college by virtue of sheer determination. Consider Steven Ng, 19, University of Pennsylvania, Class of '92. Arriving in the U.S. from a village near Canton, China, ten years ago and speaking no English, the Ng family eventually settled in a $280-a-month apartment in a New York City public housing project. Steven's parents found minimum wage jobs in a garment factory, where they earn a combined income of just $13,500.

After a stellar grammar school career, Ng won a $10,000 annual scholarship to Exeter Academy in New Hampshire. His family had to contribute an additional $1,000 annually to his support. Now Penn is helping him cover the annual $19,500 tuition, books, and room and board with a financial package made up of scholarship aid, loans, and 20 hours of work each week. Steven and his family will have to come up with another $2,500 a year to cover the balance. Despite their meager resources, the Ngs are confident they'll succeed, because they have already managed this upward mobility miracle three times. One of Steven's three older brothers is a university graduate; the others are in college.

SO FAR, most Americans can still get their kids into college without heroics. The number of students enrolling today, some 11 million in all, remains about the same as it was in 1981, although the number of graduating high school seniors has declined 16%. Amazingly, few parents save up for future tuition bills. Most pay out of current income, more as if they were buying a toaster than an investment in their children that costs more than a new car. But with costs now rising at a rate far surpassing any foreseeable increase in incomes, a crunch is not far down the road.

Still, most of the difficulties that make Americans wonder about their well-being should be transitory. Says Michigan's Curtin: "Many of the people who feel pinched today do so because they are at that point in their lives when if their incomes happen to match their needs, it's a matter of pure luck." As the boomers age, their incomes will grow ahead of those needs. One reason is that the restructuring of the 1980s, which caused pain for some Americans, has put the nation in much better shape to compete in the world—and continue prospering—in the 1990s. As the U.S. approaches that decade, the statistics show that many more Americans have won than have lost from the Reagan years. F

HIGH SCHOOL SENIORS: MOSTLY UPBEAT

From the University of Michigan's survey of approximately 3,000 students in 125 U.S. schools

What they hope to get . . . and what they will need to get it

When you are older, do you expect to own more or fewer possessions than your parents do now?

	1980	1987
Fewer	12.0%	7.4%
About as much	39.6%	32.2%
More	35.4%	39.8%
Much more	12.9%	20.6%

Doing well in school is important for getting a good job.

	1980	1987
Not important	6.8%	6.3%
Important	85.4%	86.7%
Neither	7.9%	7.1%

How they view the family

Imagine you are married and have preschool children. How would you feel about the husband working full time and the wife not working?

	1980	1987
Not acceptable	8.9%	11.6%
Somewhat acceptable	15.4%	20.7%
Acceptable	36.9%	38.0%
Desirable	38.8%	29.6%

How would you feel about both parents working full time?

	1980	1987
Not acceptable	63.4%	52.0%
Somewhat acceptable	18.5%	24.4%
Acceptable	12.4%	17.3%
Desirable	5.7%	6.3%

A man and a woman who decide to have and raise a child out of wedlock are . . .

	1980	1987
Experimenting with a worthwhile alternative lifestyle	6.9%	9.1%
Doing their own thing and not affecting anyone else	26.6%	37.7%
Living in a way that could be destructive to society	24.9%	17.5%
Violating a basic principle of morality	28.7%	23.5%
None of the above	12.9%	12.1%

How they view the nation

How good or bad a job is being done for the country as a whole by the President and his Administration?

	1980	1987
Poor	38.7%	23.7%
Fair	34.3%	30.6%
Good	19.2%	35.2%
No opinion	7.8%	10.4%

How good or bad a job is being done for the country as a whole by large corporations?

	1980	1987
Poor	21.9%	7.1%
Fair	35.9%	27.4%
Good	29.1%	46.9%
No opinion	13.1%	18.7%

Looking ahead to the next five years, do you think that things in this country will get better or worse?

	1980	1987
Better	21.2%	31.2%
Worse	62.0%	34.3%
About the same	16.8%	34.5%

How much do you worry about the economy's problems?

	1980	1987
Rarely	25.1%	44.4%
Sometimes	41.8%	39.0%
Often	33.1%	16.6%

Source: Survey Research Center, Institute for Social Research, University of Michigan

IBM AND DEC TAKE ON THE LITTLE GUYS

Upstarts Sun and Apollo own the hot market for high-performance computer workstations powered by the new RISC technology, but they can hear the footsteps. ■ *by Stuart Gannes*

IT WAS ONE OF THOSE classic cases where the little guys forged ahead while the big boys weren't paying attention. Upstart companies came from nowhere to carve out big chunks of the market for workstations, the fastest-growing segment of the computer industry. When the big boys finally noticed, they plunged in confidently—and were promptly snubbed. Now wiser and better equipped, the brand-name computer makers are preparing to crash the party again, and this time they hope they'll get a better reception. They're likely to find themselves in a heck of a fight.

In 1989 computer giants in the U.S., Japan, and Europe will launch major offensives to grab control of the $4.7 billion market for high-performance workstations, the speedy cousins of personal computers. Says Salomon Brothers computer analyst Marc G. Schulman: "Every management in the computer industry has reached the same set of conclusions about how to grow. It's going to get rather bloody out there."

Workstations are typically used in networks by groups of scientists, engineers, and, increasingly, business and finance professionals. With prices that start at $5,000 and range as high as $100,000, they are gaining in popularity because they bring a variety of new applications to the desktop. Chief among them are enhanced graphic displays that make programs far easier to use and sophisticated communication capabilities that let people at different machines share data and software. Industry experts predict that the market for such workstations will reach $20 billion annually in just five years.

Up to now the workstation sector has been dominated by innovative young companies, particularly Sun Microsystems and Apollo Computer, which jointly control more than 50% of the market. But in the next few months IBM and Digital Equipment Corp., the No. 1 and No. 2 computer makers, will go on the attack. Both companies are set to unveil workstations that incorporate lightning-fast microprocessors based on a revolutionary concept called RISC—for reduced instruction set computing.

COMPARED WITH conventional microprocessors, RISC chips have drastically simplified designs that can run programs at double or triple the speed of older machines (see box). IBM plans to use a RISC chip developed by its own engineers. DEC's workstations will be built with microprocessors designed by privately held MIPS Computer Systems of Sunnyvale, California.

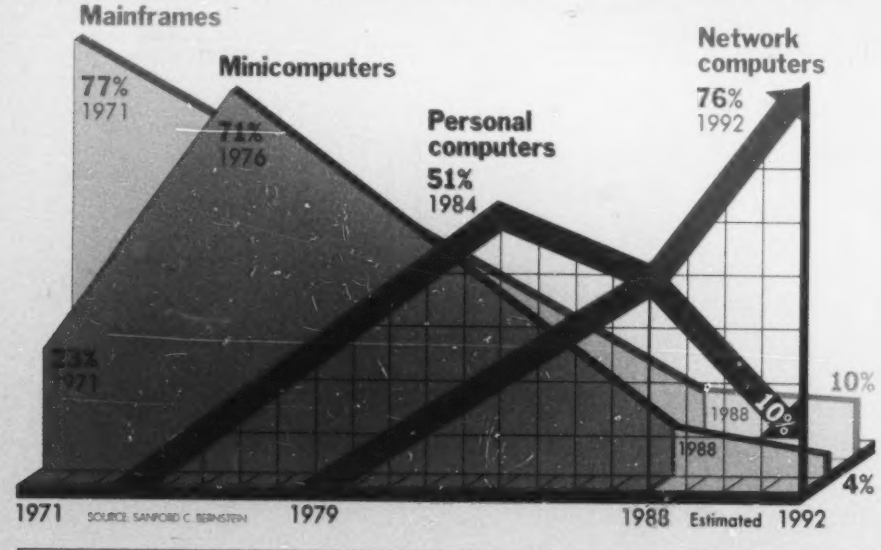
The two industry giants are in a fighting mood. "We intend to be the leader in workstations. We're tired of being annoyed by Sun," says William Strecker, DEC's vice president for product strategy. Adds Arthur G. Goldberg, director of workstation systems at IBM: "It's too early to call winners and losers in this game. As this market matures, it's going to favor those computer makers with staying power."

IBM and DEC are not the only companies planning to use RISC as a weapon. Virtually all major computer makers (and most microprocessor manufacturers) are either selling RISC designs or racing to bring them to market. Sun, Apollo, and Hewlett-Packard already sell workstations based on RISC. Other large computer makers, including Unisys and Data General in the

REPORTER ASSOCIATE *Mark Alpert*

FOUR WAVES OF GROWTH IN COMPUTERS

The chart shows shares of industry growth. Network computers will account for 76% by 1992.



Each technological advance has generated a new surge of computer sales. When PCs cooled, workstations made network computing the industry's fastest-growing market.

A technician at Sun Microsystems inserts a board with the RISC chips that have made this Sun-4 workstation the one to beat.

U.S. and Nixdorf in Europe, plan to follow suit. So will the Japanese electronics conglomerate Matsushita, through its U.S. subsidiary, Solbourne Computer. Says Bernard Lacroute, executive vice president of Sun: "Three years ago most of these big companies viewed RISC as a fantasy. Now they recognize that it is a necessity. You cannot compete without it."

War is in the air because the spoils are so huge. Desktop workstations will be the driving force of the fourth great wave of growth in the computer business, which industry analysts are calling the era of network computing. The first wave came in the 1960s with the flowering of mainframes, which the development of the transistor made possible. Then in the early 1970s the advent of integrated circuitboards touched off the second wave: the minicomputer era. The invention of the microprocessor, the computer on a chip, triggered the personal computer boom. But the growth rate of PCs peaked in the mid-1980s. Now newer generations of advanced microprocessors—particularly those that employ RISC technology—are propelling workstation-based network computing to the forefront of the industry.

Mark Stahlman, a computer analyst at the Wall Street investment firm of Sanford C. Bernstein, estimates that the network computing business—which includes sales of workstations and other equipment designed to operate on large networks—is growing at an annual rate of 40% to 45%, vs. 12% to 13% for the industry as a whole. By 1992, he predicts that sales in this segment will reach $90 billion, or close to 30% of all computer revenues and 76% of all growth in the industry (see chart). "Demand for this new style of computing will define the basic growth equation for the whole industry," Stahlman argues.

The latest generation of PCs, including new models made by Apple Computer and IBM, offer some of the attributes of workstations, but there are important functional differences between the two types of machines. PCs are personal productivity tools that let people perform tasks like word processing and financial analysis. Workstations are designed to be linked to one another and to large computer networks that give them access to company files and databases.

IBM and DEC want a big chunk of the new business. Despite their huge size, both companies dominate computer markets where growth is slowing. Their efforts to better manage their existing businesses have won faint praise on Wall Street. Over the past year IBM has tackled a massive and traumatic restructuring, which did little to restore investors' confidence. DEC's stock, which traded as high as $179.50 just a year ago, is languishing in the 90s because of lower than expected earnings and the general uncertainty about the minicomputer market. No wonder leaders at both companies are saying they will do whatever it takes to win in workstations.

Both companies view workstation networks as fuel for sales of their larger computers. As a result, says Salomon Brothers' Schulman, "you're going to see them fight hard for market share, even if it means squeezing profit margins to the bone. You've got the two biggest companies in the industry staking out a major position in a highly competitive market. They could cross-subsidize their workstation efforts with profits from the markets they dominate."

THE TWO COMPANIES admit they are behind. In IBM's case, booming sales of RISC-based workstations by companies like Sun and Apollo are a source of embarrassment. The reason: Scientists at IBM's Thomas J. Watson Research Center invented RISC technology back in the mid-1970s. What's more, Big Blue produced one of the earliest RISC workstations, the IBM RT PC, in 1986. But the machine was a flop. Its microprocessor—a modified version of a chip designed for IBM's electronic typewriters—was woefully underpowered. According to International Data Corp., a market research firm in Framingham, Massachusetts, IBM won just 3.9% of the worldwide market for technical workstations in 1987, vs. Sun's 29% and Apollo's 21%. To move inventory, IBM sharply increased sales incentives for current RT models, whose prices start at about $15,000.

continued

Eight RISC chips working in tandem generate sophisticated graphics in this experimental workstation built by IBM at its Hawthorne, New York, research center.

WHY IT'S A RISC WORTH TAKING

Sometimes less is more. That's the basic principle behind RISC, or reduced instruction set computing, the technology that is paving the way for a new generation of super-quick computers. RISC technology streamlines the microprocessor chip, the main engine inside technical workstations and personal computers, into a lean computing machine that can perform complex tasks two to three times faster than the overloaded microprocessors of the past.

The traditional microprocessor chip contains a complex web of instructions that translate programming language into electronic signals. Over the years, as computers gained power, more and more of these instructions were packed onto each microprocessor. But scientists have known for many years that a computer typically spends most of its time performing only 20% of its instructions—basic operations such as addition and subtraction. The designers of the RISC chip stripped away the least-used instructions and created a microprocessor that was simpler and faster.

Actual size of a RISC microprocessor

For example, to multiply three times five, a traditional microprocessor would have a set of special instructions built into it to do the multiplication in a single step. A RISC microprocessor, on the other hand, might not have the ability to multiply. It would simply add five three times. Although the calculation requires more steps, the answer comes out more quickly because each step is performed almost instantaneously.

Engineers can wax poetic about RISC. Some compare old-style microprocessors with their myriad instructions to the thousands of characters in the Chinese language. They compare the RISC microprocessor to the English language, which employs only 26 letters but accomplishes the same task of communication.

The idea behind RISC is not new. But the technology didn't catch fire until recently, partly because the RISC machines were incompatible with the older proprietary software used by most computer manufacturers. Now many computer companies are switching to Unix, an operating system that can be easily adapted for different types of computers and promises to allow the same software applications to be used across a wide range of machines. The bonus is that RISC machines also run on Unix. That makes RISC more practical and has encouraged many companies to revamp their software to take advantage of the phenomenal performance of a RISC machine.

Computer manufacturers aren't the only ones trying to jump on the RISC bandwagon. Semiconductor companies closed out of the microprocessor business by Intel and Motorola see RISC as a way to muscle back in. Texas Instruments, LSI Logic, Fujitsu Microelectronics, Cypress Semiconductor, and Bipolar Integrated Technologies have all obtained licenses to manufacture the RISC microprocessor designed by workstation maker Sun Microsystems. The chip is at the heart of the Sun-4 family of machines that is Sun's latest line of workstations.

Advanced Micro Devices has built its own RISC microprocessor, which it plans to market as a controller for electronic equipment. John East, a senior vice president at AMD, says the chips can go into laser printers, graphics boards, and the communications equipment that directs the flow of data in a computer network. East believes more of AMD's RISC microprocessors will wind up in these uses than in workstations. He estimates that the RISC microprocessor business will reach $5.3 billion a year by 1993, with nearly all of it up for grabs. "The RISC chip is just better, like a jet engine is better than a prop engine," East says. "I've been in this business for 20 years and I've never been more excited." **– Mark Alpert**

IBM insists it will not stumble again. William Lowe, president of the entry systems division, which sells some $7 billion worth of personal computers and workstations annually, is mounting a massive effort to improve the RT. "We're spending as much on RISC technology as we are on our PC business, which is obviously quite important for us. Our objective is to be the leader in the workstation market," says Lowe. He promises that next year's RISC-based models will be twice as powerful as the current generation of machines.

DEC IS ALSO running to make up lost ground, although for quite different reasons. The minicomputer maker was blind-sided by the workstation boom. For most of the 1980s, DEC focused on different opportunities. Under the leadership of founder and president Kenneth Olsen, the company sought to expand sales of its highly profitable VAX family of computers. Working from its strong base of engineering and scientific customers, DEC embarked on an ambitious and successful drive to win more commercial accounts. Explains DEC's Strecker: "We did a rather great job, quite honestly. We went from a small company to one that gives IBM some fits. The strategy required to take on IBM was not one of making hot boxes for the desktop."

But even as DEC encroached on IBM's turf, many of its loyal technical customers began buying workstations from Sun and Apollo. At first this turn of events seemed perplexing—but hardly alarming. Executives at DEC headquarters were certain they could build a better workstation than their upstart competitors. And while DEC began experimenting with RISC microprocessor designs as early as 1985, many engineers in the company were not impressed by the new technology. "Even today there is no consensus in our company about what the advantage of RISC is," says Strecker. Not surprisingly, DEC's first line of workstations, called VAXstations, featured the same microprocessor as the VAX.

The VAXstation did not bomb as badly as the IBM RT PC, but it was not the success that DEC expected. DEC had designed it to work best with its proprietary VMS operating system—the software that controls the functions of a computer—but the price wasn't competitive with machines that ran Unix, the operating system companies are beginning to favor. In 1986, as Sun and Apollo continued to

make inroads with DEC accounts, Olsen reorganized the company's workstation sales efforts. Explains Joseph DiNucci, the executive put in charge of workstation sales: "We knew we were losing big accounts left and right. Our goal was to let the median sales guy win the median sales battle without calling in the cavalry. But with some customers we weren't even getting on the playing field."

A turning point for DEC came in April 1987 when executives at National Semiconductor, a longtime DEC customer, told DiNucci they were placing a large order with Sun. "It was like taking a full roundhouse punch," he recalls. "When you do your best and the customer looks you square in the eye and says, 'Not good enough,' it really hurts." Within a month DEC's top management decided the crisis was real and drastic action was required. To stimulate sales the company slashed the VAXstation's price by more than 50%.

ANDY FREEBERG

IBM's William Lowe promises to finally get it right with an improved workstation in 1989.

DEC also decided to build a RISC-based workstation as quickly as possible. At first there was no question that the job would be done by DEC engineers. But in a matter of months the company became convinced that it wasn't moving fast enough. "Six months into an 18-month project, we were still 18 months away," DiNucci explains. "As the project unfolded it became apparent the best use of resources was to buy the microprocessor technology rather than reinvent it on our own."

In a daring challenge to the company's inbred corporate culture, DEC decided to shelve its own RISC project and use the microprocessor from MIPS Computer Systems in a workstation code-named MAX. In this case, explains DiNucci, "the most important variable for one of our product development efforts became how fast we could get it to market. We had a product introduction date and we managed backwards from it."

Equally significant was the fact that DEC agreed to build a computer system based on another company's technology. Says Goldman Sachs computer analyst John Levinson: "The fact that DEC is willing to go outside for important technology marks a major change. They are finally getting rid of their 'not invented here' attitude."

DEC's decision bears a striking resemblance to the sequence of events in 1980-81 that led IBM to build its PC with a microprocessor designed by Intel. In both cases a market crisis was the catalyst for change. According to MIPS Chairman Robert Miller, a former IBMer who witnessed the development of both IBM's PC and DEC's MAX, executives at DEC refer to the new workstation push as Brave New World. "These guys are emotionally torn up about this," says Miller. "They're wrestling with a cultural transition that's enormous. These technical guys are having to face up to the fact that in an important area of the industry, they couldn't do the best job. It's like coming home and having your wife say, 'I really love you, but you're not the world's best lover.'"

Miller believes that the brave new world for DEC resembles the model pioneered by IBM, whose success with PCs was based on its willingness to acquire technology from outside sources. "Both companies realized they had to take a new approach," says Miller. "If you go back and look at IBM's efforts to build a PC in the late 1970s, it was one disaster after another. They screwed up time after time until they recognized that they had to make a 90-degree turn. In large companies you can't change until you convince people you have a crisis. I'm convinced that DEC is crossing that bridge."

Both DEC and IBM are hoping RISC will give them the firepower to neutralize the performance advantage the competition now holds. Once this happens, say both companies, they will be in a better position to unleash their traditional strengths

RICHARD HOWARD

William Strecker's DEC must make the cultural adjustment to RISC technology.

—their huge sales forces and service organizations—in the workstation wars.

As the big boys come crashing in, smaller companies like Sun and Apollo hope they can outrun the behemoths. "Performance is absolutely fundamental in this business, and time to market is everything," says Sun's Lacroute. "Competing against IBM and DEC is both a threat and an opportunity. They have big sales forces, but by lending credibility to our strategy, they are opening new doors to for us."

SOME ARGUE that improved technology will not automatically give the giants the advantage. "This is a technology we've been born and raised with," says Michael Gallup, director of product marketing for Apollo. "Success in this technology is not something you can get just by pulling out a checkbook."

Analyst Stahlman believes that sheer size will be less of a factor in the workstation wars than IBM and DEC might hope. "The burden of proof is on the bigger companies, because they came into the race handicapped," he says. Stahlman points out that each of the technological waves that swept through the computer industry propelled new winners to the forefront. The one exception has been IBM's remarkable success with the PC. Now that the battleground is shifting to workstations, DEC and IBM are hoping that they have enough clout to make history's exception repeat itself.

MEDICAL CARE'S NEXT REVOLUTION

Believe it or not, doctors often don't know which treatments pay off best for patients. A vanguard of physicians hope to conquer this ignorance. ■ *by Edmund Faltermayer*

CONSIDER what doctors, to say nothing of patients, don't know about the value of just one procedure. Each year about 80,000 Americans get a carotid endarterectomy, a kind of Roto-Rooter job on clogged neck arteries. Typically costing $9,000, counting the bill for a hospital stay, the operation is designed to prevent strokes. Another triumph of modern medicine? Or an overly risky, overdone alternative to cheaper drug therapy? Incredibly, no one knows for sure, and no one is tracking the patients on a systematic basis to find out.

The same holds true for scores of other medical ministrations. Food companies know the impact of a redesigned ketchup bottle on sales. But the virtuosos performing hysterectomies, installing pacemakers, and bypassing diseased coronary arteries have only patchy information about the real payoffs. "Half of what the medical profession does is of unverified effectiveness," asserts Dr. Paul M. Ellwood Jr. of Minneapolis, in a phalanx of physicians who want to cut down on the guesswork.

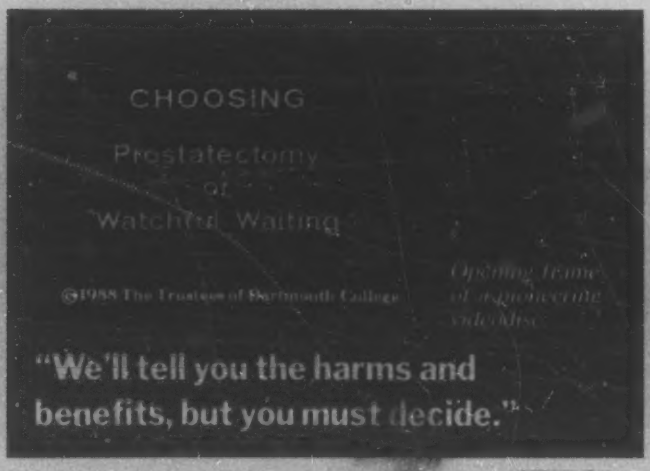
Half of something as stupendous as the U.S. health bill—now 11.4% of GNP, or nearly twice what the military gets—implies a huge ore body that could be mined for savings. That should be of special interest to business, which picks up the biggest chunk of medical expenditures. Health insurance premiums have jumped anew in 1988, following several years in which companies successfully slowed the rise.

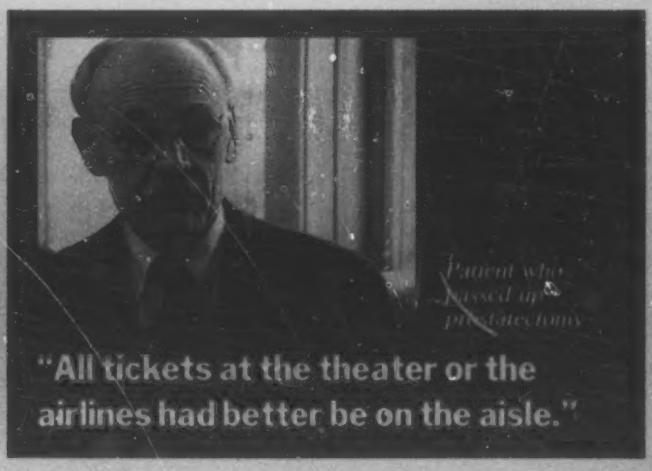
Abetting the persistent upward trend is what one consultant calls "MD-ification." Corporations, for all their new cost-containment mechanisms, don't know enough to go eyeball to eyeball when professionals are determined to do an operation. Yet business executives would be shocked if they knew of the doctors' own uncertainties. The problem is rare in the cut-and-dried matter of treating acute afflictions—prescribing penicillin for pneumonia or setting a broken bone. But doctors increasingly toil in the murky area of chronic ailments: arthritis, angina chest pain, impaired vision. Here the question of which treatment is best can be settled only with data.

The need for much more of it has never been so urgent. The new law liberalizing Medicare payments for catastrophic illness promises to boost demand for health services still further. So could the extension of health insurance to the uninsured (FORTUNE, September 26). A rollback of ignorance would bring huge benefits. With better data, business could effectively challenge proposed treatments. Many doctors might enjoy better protection against malpractice suits. Patients could be the biggest gainers. If the pros and cons of alternative treatments were better known and conveyed in lay language—a rarity now—patients could have a real say in how they are scanned and sliced.

THE GROWTH of health maintenance organizations, whose membership has tripled to 31 million in the past six years, was supposed to supply much of the missing knowledge. Operating on a fixed "subscription" payment set annually for their members, HMOs have strong reasons to study their centralized patient files for ways to weed out wasteful procedures. Alas, such studies have not been extensive. Until recently, HMOs have managed to save plenty of money just by cutting down on hospital stays.

REPORTER ASSOCIATE *Reed Abelson*





That's particularly disappointing to Ellwood, 62, a witty, searingly insightful visionary who heads a medical think tank called InterStudy. He led the proselytizers when the concept of prepaid care was barely known in the early 1970s, and the very term HMO is his. But the rates at which HMO doctors perform various procedures, it turns out, are not so different than elsewhere. Caesareans and other debatable operations, moreover, are way up, just as they are in the country at large. "What HMOs haven't done, which I had hoped, is manage the *content* of medical care," Ellwood says. Why not? "HMO doctors are ignorant, just like all doctors."

Having shaken up the medical system once, Ellwood seeks to do it again. He wants the records of millions of encounters between doctor and patient, whether in HMOs or in the traditional fee-for-service system, recorded in computers and the results of treatment routinely monitored through follow-up questionnaires to patients. "When we're spending a half trillion dollars a year on health care," Ellwood says, "we ought to know what works." Dr. Arnold S. Relman, editor of the influential *New England Journal of Medicine*, says that "assessments" and the general concern about quality are "the third revolution in medical care," the first being the spread of health insurance and the second the revolt of the payers. Physicians must be in charge of the third revolution, Relman says, for only they have the training.

Though better information could put an end to some fat fees, doctors are starting to rally behind the idea. Many fear a loathsome alternative: another round of heavy-handed cost controls imposed by nondoctors. Dr. William L. Roper, a pediatrician who runs the federal government's Medicare and Medicaid programs, adds that "those on the firing line want better information so they can do a better job for their patients."

TOO MUCH DOCTORING, SAY THE DOCTORS

PROCEDURE	"UNJUSTIFIED"	"DEBATABLE"
Coronary artery bypass (cost: $37,000)	14%	30%
Carotid endarterectomy ($9,000) Removal of deposits from clogged neck arteries	32%	32%
Pacemaker implants ($9,000)	20%	36%
Coronary angiography ($3,400) X-rays of heart arteries injected with dye	17%	9%
Upper gastrointestinal tract endoscopy ($750) Visual examination with fiber-optic device	17%	11%

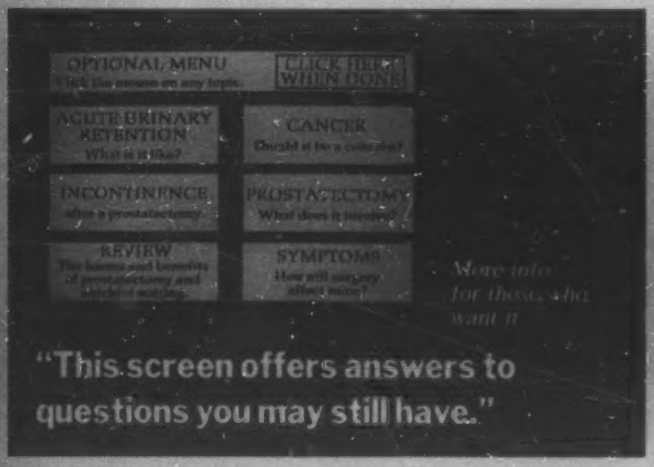
SOURCES: RAND CORP.; DR. ALLAN M. GREENSPAN ET AL.; VALUE HEALTH SCIENCES

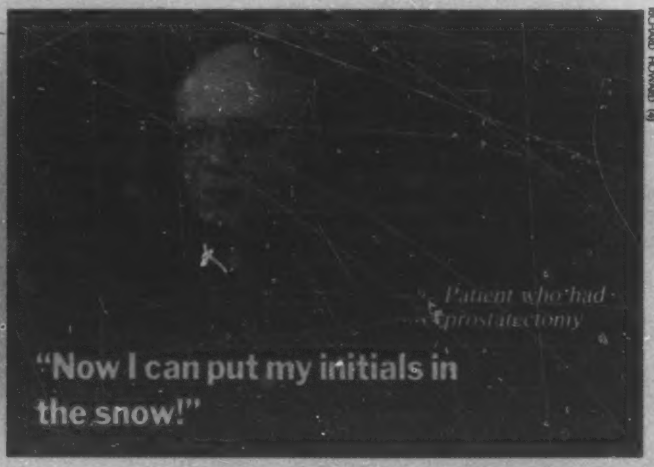
Big savings might result from better data on which patients really need fancy operations and tests. Panels of doctors developed the criteria upon which these findings are based.

MEDICAL RESEARCH is hardly in short supply. Teams of doctors report all the time on the success of this new operation or that diagnostic device. But the studies often leave important questions unanswered because the number of patients is small, the scope of inquiry narrow, or the methodology faulty.

Take the controversy on how to treat hardening of the leg arteries, which can turn walking to agony and lead to amputation. Doctors have four main alternatives: Do nothing, prescribe physical therapy and exercise, perform bypass surgery, or use a newer procedure called percutaneous transluminal angioplasty, or PTA—inserting a balloon and inflating it to clear the arteries. During a 1987 visit to Duke University's Center for Health Policy Research and Education, Dr. Raphael Adar, a prominent Israeli surgeon, pored over 39 papers on the use of PTA for the leg. As disclosed in a recent issue of *Health Affairs* magazine, Adar found all the studies deficient. Not even the better ones reported on the outcomes of greatest concern to patients: the relief of pain and the continued ability to walk.

"For people who read this kind of information, it's very frustrating," says Dr. David Eddy, a professor of health policy at Duke and a critic of much medical research. Meaningful numbers on the cost effectiveness of tests can also be hard to come by. When left in the dark, Eddy says, panels of doctors charged with evaluating the tests' usefulness fall back on their own best





RICHARD HOWARD (4)

STEVE WOIT-PICTURE GROUP

clinical impressions. One panel was asked to estimate the effect of a particular testing regimen—annual sigmoidoscopy and stool specimens—in reducing cancers of the colon and rectum, which annually take the lives of about 60,000 Americans. The answers ranged all the way from a 5% reduction in deaths to 95%.

Elsewhere, shafts of knowledge have begun to pierce the darkness. Financed primarily by foundation funds, Rand Corp., a research organization in Santa Monica, California, has looked into those carotid endarterectomies. First the researchers studied the literature and listed the hundreds of situations in which the treatment might help. Then they asked a panel of nine doctors to rate its appropriateness in each situation and reviewed the records of 1,302 Medicare patients in three areas who got the operation in 1981.

The conclusion, published earlier this year: Just over a third of the carotid endarterectomies were appropriate, while 32% were borderline. The other 32% should not have been performed, mainly because the symptoms did not seem serious enough to warrant the considerable risks. During the hospital stay, 3.4% of all the patients who got carotid endarterectomies died because of complications from the operation. Another 6.4% had strokes—just what they had hoped to avoid. The researchers recommended that the operation be curtailed.

Three other procedures have come under Rand's scrutiny. As the table on page 127 shows, the researchers found two diagnostic tests much in vogue to be overdone, though not as greatly as some critics assert. But Rand recently came down hard on coronary artery bypass surgery.

More than 230,000 Americans had coronary bypass operations last year, twice as many as in 1980. Few are life-and-death affairs performed on patients who have just had heart attacks. The aim generally is to relieve chest pain. Two alternatives—drugs and clearing the coronary arteries with an inserted balloon—are less costly and sometimes just as effective. Reviewing 386 bypass operations done in three hospitals in 1979, 1980, and 1982, Rand concluded that only 56% were clearly appropriate.

"Appropriateness" studies are a giant step forward, but they have limitations. They are based on what committees of specialists believe is the right time to test or operate. To *know* what works requires surveys of how patients made out later on—typically at least a year later. Contact with patients often ends when they walk out of the hospital or the doctor's office. Dr. John E. Wennberg, an epidemiologist at Dartmouth Medical School, made some fascinating discoveries in a follow-up study of men who underwent prostate operations.

WENNBERG, 54, has a quietly earnest manner that befits one with a sense of mission. Because doctors don't know the probable outcomes of one treatment vs. another, he says, medicine is in an "intellectual crisis." When studying health care patterns in rural New England in the 1970s, Wennberg was struck by significant variations in the rate at which doctors performed tonsillectomies, hysterectomies, and other operations. Later he found sharp differences in medical spending in Boston and New Haven, Connecticut. Though the health characteristics of both cities' populations are similar, Boston was spending the equivalent of 16% of GNP on medical care to New Haven's 9%.

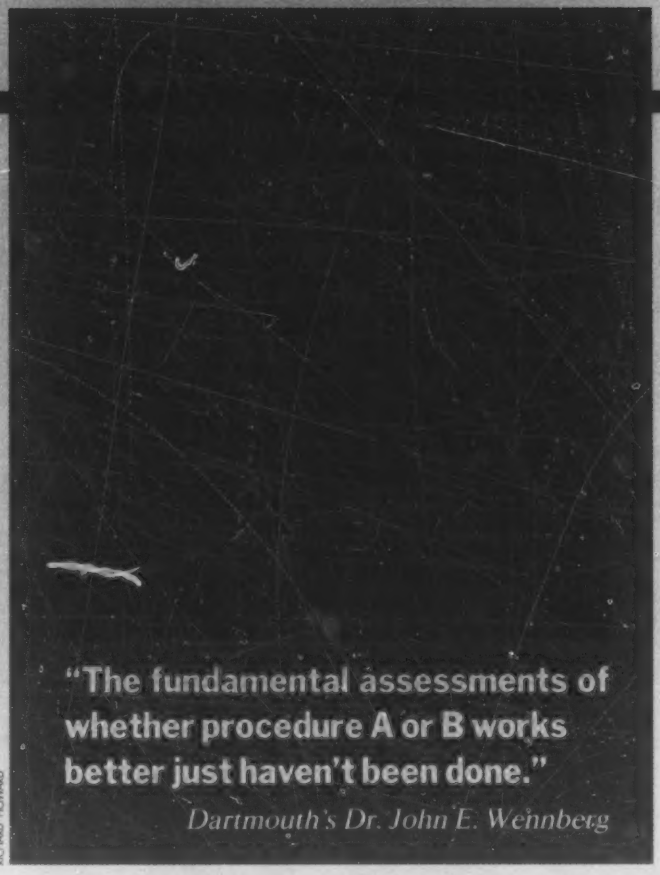
Prostate operations, which varied from place to place by a factor of four in the earlier New England study, provided an opportunity for Wennberg and his colleagues to pioneer. Few are performed to save a man's life; even cancer of the prostate is rarely fatal. But many physicians have long advised preventive surgery to avoid a greater risk when the man is older. More than 300,000 operations on benignly enlarged prostates were performed in the U.S. last year at a cost of about $3,500 each.

Two-thirds of Maine's practicing urologists agreed to participate in Wennberg's survey of patients getting prostatectomy operations, starting in mid-1983. Most of the patients were 65 and older. An initial interview detailing each man's symptoms was followed by another three months after surgery and telephone interviews after six and 12 months. The findings, based on 263 men who completed all three postoperative interviews, were published last spring in the *Journal of the American Medical Association*. The researchers found that the "preventive" argument for surgery is wrong, for the operation caused a slight decrease in life expectancy. It is justified solely, they concluded, for what physicians call quality-of-life reasons: The patient is having problems urinating.

For most of the men, the quality of life improved over a year: 78% reported mild or no symptoms and 16% moderate problems, leaving only 6% with serious symptoms. The results of the survey have been incorporated into a videodisc that will be tested before focus groups of doctors and patients this fall. Running 28 minutes, not counting additional information the viewer can select at the press of a button, the disc is a breakthrough in medical consumer information.

To background music, the title comes on screen: *CHOOSING—Prostatectomy or Watchful Waiting*. Dr. Charles Culver, a psychiatrist who serves as narrator, says the operation brings "improvement at a price.

continued



"The fundamental assessments of whether procedure A or B works better just haven't been done."

Dartmouth's Dr. John E. Wennberg

RICHARD HOWARD

We'll tell you the harms and benefits, but then you must decide." Four patients appear. One of two who agreed to the operation can scarcely contain his enthusiasm: "Now I can put my initials in the snow!" One who chose "watchful waiting" is asked whether his condition interferes with daily activities. His mildly jovial reply: "All tickets at the theater or the airlines had better be on the aisle."

While pointing out the advantages of the operation, the narrator cautions that the negatives must not be overlooked. Within three months of the operation, 8% of the men were back in the hospital with serious complications. Others encountered new difficulties: 4% of those who never had the problem became incontinent to some degree, and 5% of those who previously had erections became impotent. If the videodisc were generally available, many men would probably turn down the operation, particularly those who don't have severe problems.

Not too many years hence, Wennberg hopes, a typical doctor's office will have perhaps a score of videodiscs covering as many illnesses. To those accustomed to the dictatorial style of medicine, it might seem utopian to expect doctors to furnish information enabling patients to argue with them. But many doctors, particularly family physicians, might welcome the chance to help patients make up their minds. It's a safe bet, too, that payers would encourage the practice.

Wennberg favors a big increase in funding for a little-known federal agency called the National Center for Health Services Research and Health Care Technology Assessment. Despite the impressive name, its budget has declined since the 1970s, to $47 million. Wennberg and others want the figure boosted to at least $200 million. That would finance more studies like the one on prostatectomies. Says Wennberg, who notes that the drug industry spends billions evaluating its products: "The fundamental assessments of whether procedure A or B works better just haven't been done."

Ellwood has something far more ambitious in mind, which he calls "outcomes management." The health system would keep track of *all* patients and their progress after treatment. Initially the goal would be to track chronic illnesses whose treatment is of uncertain value. Doctors would constantly adjust their procedures in response to feedback on what works best, much as a retail chain adjusts its buying according to on-line data that show what is selling.

THE BEGINNINGS of such a system can already be discerned. Medicare boss Roper's outfit, the Health Care Financing Administration, has agreed to pay for pilot studies of outcomes management at ten Midwestern HMOs. Quality Quest, a subsidiary of Ellwood's InterStudy, will be in charge. One of the first tasks is to select a short, standardized "quality of life" questionnaire in which patients would describe their condition before treatment and later on. Such questionnaires, developed in the past few years by Boston psychometrician John E. Ware and others, include general queries on the patient's well-being and ability to function as well as some related to his specific illness. Sample question for a victim of heart disease: "Do you need to sleep sitting up at night?"

Ten other organizations are interested in financing pilot studies, among them the state of Massachusetts and the Blue Cross and Blue Shield Association in Chicago. When asked what he thinks of Ellwood's idea, the association's president, Bernard R. Tresnowski, responds, "Right on!"

"The health care system," Ellwood declares, "has become an organism desperately in need of a central nervous system that can help it cope with the complexities of modern medicine." Until a single national databank can be created, he would settle for a sharing of information among insurers and health organizations.

One of the biggest data pools is Health Information Reporting Co., set up three years ago by nine of the largest Blue Cross and Blue Shield plans and the national association to analyze payment and utilization trends among 15 million members. Another is the federal government, which has years of claims data covering 32 million Medicare recipients. In neither case are patients surveyed later on to gauge the effectiveness of treatments, though the Blues and Medicare are both interested in the idea. Data on patients' fates are already gathered, however, for some major illnesses. For example, the National Cancer Institute has access to data on more than a million patients, and a pool of data banks called Aramis tracks 28,000 arthritis victims. Some of the findings are available to the public.

Doctors' offices, which long ago turned to computers for billing, are still paper holdouts when it comes to maintaining patients' medical records. Many hospitals and health care organizations, on the other hand, have gone heavily electronic. Intermountain Health Care of Salt Lake City, which in 1975 took over hospitals formerly owned by the Mormon church, has created what may be the best computerized clinical database in the U.S. At some bedsides, doctors can call up a patient's history on terminals, including past test results and even recommended procedures. Dr. Brent James, who is director of medical research at Intermountain, plans to add follow-up surveys of discharged patients.

Computers already influence what doctors do. At Wishard Memorial Hospital in Indiana University's Indianapolis medical center, at least 400 doctors have access to computerized patient records. In an experiment at reducing blood tests in the mid-1980s, terminals began flashing information on the odds that each of eight common tests would reveal a suspected abnormality. Result: Billing for the eight tests dropped 9%.

United HealthCare, a Minneapolis firm that owns seven HMOs and provides contractual services to 16 others, maintains prescription records for two million people. About 500,000 live in the Twin Cities area, where pharmacies are tied into a computer network. When the computers spotted excessive use of diet pills a few years ago, the HMOs stopped paying for them and doctors cut down on prescribing them.

The next medical revolution will quickly sputter if it merely amasses information that doctors ignore. It's unlikely insurers will let that happen. Willis Goldbeck, president of the Washington Business Group on Health, a national organization of large companies with employee medical plans, says that "physicians will change their behavior if the new knowledge is tied to reimbursement."

SUCH TIES are already being forged. Citing Rand Corp.'s studies, California Blue Shield has decided to require a second opinion on carotid endarterectomies. One of Rand's senior researchers on the medical studies, Dr. Mark Chassin, has become senior vice president of a new company called Value Health Sciences, which is turning the Rand findings into a computer software program that insurers will be able to use as a cheaper alternative to a second doctor's opinion.

Thus the payers are using doctor-generated information to control what doctors receive. The implications cause a few shivers among physicians. Will medicine become a "cookbook" affair, with the treatment for each set of symptoms limited to what shows up on a computer screen? No two patients are alike, after all, and doctoring has always been a subtle blend of feel and fact. Roper, for one, doubts that cold science will eliminate the need for healing art. Airline pilots are required to follow all sorts of standard checkout procedures, he says, but flying the big ship still calls for experience. By putting as much uncertainty as possible behind them, doctors should find their calling more satisfying than ever. ■

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